**SECTION 7 GUIDELINES - Snake River Basin Office**
**Columbia Spotted Frog, Great Basin Population (candidate)**
**(*Rana luteiventris*)**

# I. BACKGROUND

## Legal Status

Populations of the Columbia spotted frog (*Rana luteiventris*) are found from Alaska and British Columbia to Washington east of the Cascades, eastern Oregon, Idaho, the Bighorn Mountains of Wyoming, the Mary's, Reese, and Owyhee River systems of Nevada, the Wasatch Mountains, and the western desert of Utah (Green et al. 1997). Genetic evidence (Green et al. 1996) indicates that Columbia spotted frogs may be a single species with three subspecies, or may be several weakly-differentiated species. The Service currently recognizes four populations based on disjunct distribution: Northern, Great Basin, Wasatch, and West Desert. Columbia spotted frogs are believed to be abundant within the Northern population of the species' range from Alaska to Wyoming (Gomez 1994). The other three disjunct populations (Great Basin, Wasatch, and West Desert) received candidate status in 1993 based on the loss of subpopulations in a number of areas in Nevada. At that time, the Great Basin population, the subject of these guidelines, was given a priority 9; in 2001 the priority was raised to 3 (the highest rank possible for a subspecies), based upon the discovery of *Chytridiomycosis* in the Owyhee subpopulation, declining numbers, and the imminence of threats. The Great Basin population is distributed in isolated patches from eastern Oregon, through southwest Idaho, and into Nevada; these guidelines apply to that part of the Great Basin population found in Idaho only.

## Species Description

Great Basin population Columbia spotted frogs have a light-colored jaw stripe and are light to dark brown or olive dorsally with varying numbers of irregular black spots. The skin texture varies from smooth to rugose, they have dorsolateral folds, and coloring on young is less distinct. Ventrally, coloration ranges from white to yellow, and mottling is present to varying degrees. The hind feet are large and have webbing that extends nearly the length of the hind toes. At metamorphosis, spotted frogs range in size from 23-33 mm (approximately 7/8" - 1¼ ") snout-vent-length. In their third year, they are generally large enough that gender may be determined. As adults, they can vary in size from 50-90 mm (2"-3 ½") depending on gender and to some extent, age.

## Life History

Great Basin population Columbia spotted frogs emerge from overwintering sites soon after breeding sites thaw (Engle 2001). Breeding is explosive (as opposed to season-long), occurring only in the first few weeks following emergence. Softball-sized egg masses are usually found in groups, typically along northeast edges of slack water amongst emergent vegetation. Breeding sites include beaver ponds, improved spring ponds, oxbow pools, spring seeps, and eddies of streams. Newly-hatched larvae remain clustered for several days before moving throughout their

natal site. Tadpoles are black and 8-10 mm (3/8") in length at hatching (April or May), but their dorsal color lightens to olive-brown and their ventral surface becomes white as they increase in size. Their eyes are located on the top of the head and do not protrude to the sides when viewed from above. They commonly metamorphose at 70-75 mm (3") as early as mid-July. As young-of-the-year transform, many leave their natal sites and can be found in nearby riparian corridors. Although Great Basin population Columbia spotted frog tadpoles have been observed as late as mid-November, it is not believed that they overwinter as tadpoles. Migratory movements between overwintering, breeding, and foraging sites have been documented, as well as breeding site fidelity in females (Engle 2001). Preliminary skeletochronological work indicates that Columbia spotted frogs can live at least 9 years in southwestern Idaho (Engle and Munger 1998).

## Habitat

In Idaho, the Great Basin population of Columbia spotted frogs occurs south of the Snake River Plain in the Owyhee Uplands (Figure 1). Suitable habitat includes riparian areas of the sage-juniper brushlands, where emergent vegetation and standing water are present. Columbia spotted frogs frequent streams, slack water pools, and areas of permanent water, but can also be found in intermittent streams and meadows in the spring and early summer. It is likely that historically spotted frogs also used habitats maintained by beaver. Overwintering occurs in areas where the water does not freeze and remains oxygenated, such as springs and streams (Patla and Peterson 1994), especially those with willows or undercut banks.

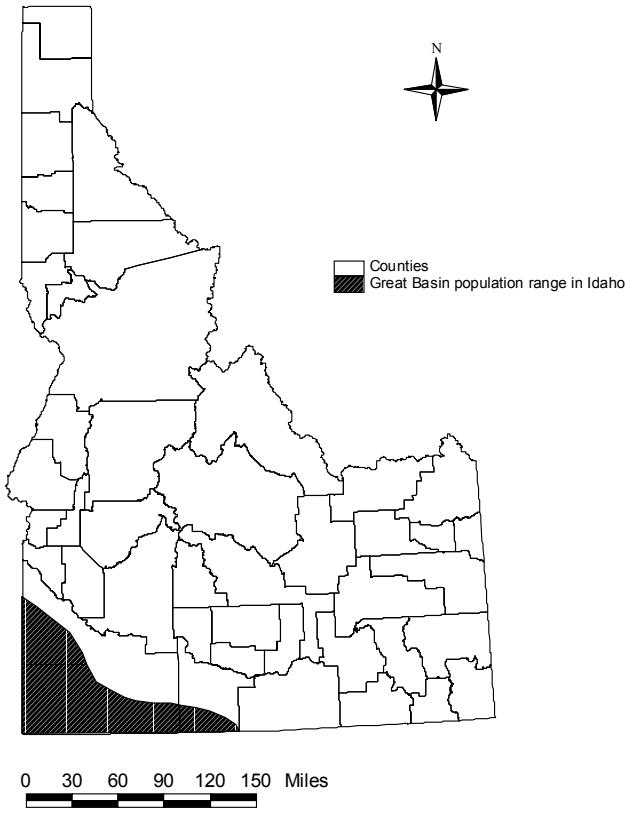


Figure 1. Range of known Great Basin population Columbia spotted frog occurrence in southern Idaho.

## Population Status/Impacts to the Species

The Service, in its Federal Register notice issuing its "warranted but precluded" finding on spotted frogs in 1993 (USFWS 1993), suggested that spotted frog populations south of the Snake River plain should be managed in a way similar to those disjunct populations that are in decline, rather than managed as those populations north of the Snake River in Idaho that appear to be doing well. As of 2001, 49 Element Occurrences for Great Basin population Columbia spotted frogs were recorded at the Idaho Conservation Data Center; 1 was extirpated, presence was not verified at 5, 20 had 5 or fewer frogs observed at the most recent survey, 3 had declines (detected by monitoring surveys), and 1 increased from 1 to 6 individuals (Engle 2002). A long-term monitoring program was initiated in 1999 which includes presence/absence surveys, monitoring of sentinel sites, and the exploration of unoccupied suitable habitat, in a rotation that will document species presence at each known site every three years.

## Threats

*Habitat loss*

The biggest known potential impact to spotted frogs in southwest Idaho is habitat alteration and loss, specifically, loss of perennial wetlands used for feeding, breeding, hibernating, and migrating. Habitat fragmentation can prevent movement within the natural homerange of individuals and can divide the population into a series of smaller subpopulations. If Great Basin population Columbia spotted frogs do not readily recolonize new or extirpated sites, then the dynamic nature of metapopulation structure is compromised, and the population will decline as fragmentation increases.

*Livestock impacts*

The potential for interaction between livestock and Great Basin population Columbia spotted frogs is especially high in areas where water sources are rare. Whether the impact of livestock is negative, neutral, or positive may depend upon the intensity and timing of grazing and on site-specific habitat characteristics. Grazing can lower the water table due to compaction, erosion, and loss of vegetation. Late season grazing that removes vegetative cover from migration corridors and breeding sites can increase the risk to newly metamorphosing froglets and migrating adults. Bank-stabilizing rushes, sedges, and willows may be replaced by weedy species and less protective grasses (Tueller 1988, Platts 1990, Clary 1995). The decrease in riparian vegetative cover reduces the humidity at ground level and may expose frogs to predators and desiccation. Decreased water quality and quantity (each cow can drink 15-20 gallons of water a day) in late summer may facilitate the spread of disease if frogs are concentrated in small, isolated pools, as opposed to wide, clean wetlands (M. Drew, Idaho Department of Fish and Game, personal communication, August 22, 2002). Egg masses can be stranded in hoof prints at breeding sites, increasing the likelihood of freezing and/or predation loss (J. Engle, personal observation). Direct trampling of breeding sites can kill an entire cohort. Trampling of pond banks and seeps can compress and close porous subterranean passageways to preferred hibernation sites. Nutrient-rich waters have reduced oxygen contents because of bacterial decomposition of organic material (Wetzel 1983) making overwintering sites less suitable.

*Spring Development*

Springs provide several types of habitat critical to Great Basin population Columbia spotted frogs. Spring outflows provide a permanent source of water and habitat for breeding, feeding, and hibernating. Water percolating from underground provides an opening that can be traversed by a frog and provides protection from predation. Springs are protected from freezing by a constant temperature flow, and the water maintains important riparian vegetation. Springs that have been developed for human or livestock use are often excavated or boxed and piped to watering troughs. The developments change the natural hydrology by manipulating surface water pressure, increasing evaporative loss, and reducing widespread moist habitat. Developed springs can actually function as ecological sinks for wildlife, attracting many species to confined areas where disease and increased predation may occur.

*Water diversion*

Loss of aquatic habitat can occur from the conversion of wetland habitats to irrigated pasture and by diverting water from riparian areas. Existing water rights in many areas often exceed average instream flows resulting in stream dewatering, especially a problem in low water or drought years.

*Loss of Beaver*

Beavers have the potential to play an important role in maintaining and enhancing wetland ecosystems. Beaver dams are commonly destroyed in southern Idaho, and their loss has caused a decrease in breeding and hibernating habitat available for Columbia spotted frogs (Engle 2002).

*Road Construction*

Road construction and crossings near Great Basin population Columbia spotted frog habitats can result in increased mortality due to road kill, decreased water quality, and increased habitat fragmentation by introducing a barrier to movement such as a fill or culvert. This fragmentation may be particularly detrimental in situations where the existence of a population is dependent upon immigration from other populations (Sjögren 1991).

*Dams*

The construction of dams can eliminate Great Basin population Columbia spotted frog habitat by inundating breeding and hibernating sites and wetland areas above the dams. Construction of dams can also fragment frog populations, thereby increasing the likelihood of local subpopulation loss. Reservoirs are also likely sites for introduction of predatory fish and bullfrogs. The alteration of water flows below dams may reduce seasonal connectivity and prevent the formation of suitable pools for breeding.

*Fire*

Widespread wildfires historically occurred naturally in the west, and Columbia spotted frogs were subjected to their effects for long periods of time. Natural fires typically occur during the summer when vegetation is dry and spotted frogs are at moist feeding areas or possibly aestivating. Controlled burns in the spring (to reduce fire intensity) may impact migrating or foraging frogs. Fires intended to improve habitat for big game and vegetative production for livestock often remove willows directly in riparian corridors, changing the natural functioning processes and removing important habitat components for spotted frogs.

*Introduced fishes*

Introduced fish can prey upon eggs, larvae, and adults, and their presence may fragment the population by reducing the connectivity between populations that remain safe from fish. It is probable that introduced smallmouth bass in the Owyhee River have impacted the distribution of Great Basin population Columbia spotted frogs at lower elevations in the South Fork Owyhee River and the Owyhee River system (Engle 2001).

*Bacterial and fungal infections*

Although there is no documentation of confirmed instances of bacterial infections in Great Basin population Columbia spotted frogs, the discovery of *Chytridiomycosis* in 2001 at Circle Pond in the Owyhee Uplands raises extreme concern for the extent to which this fatal fungal disease is present in southwest Idaho. One indicator of the disease is the absence of frogs from suitable habitat or a decline in numbers at known sites. Symptoms include lethargic behavior, lesions, and hemorraghing; lethargic frogs become easy prey and are quickly removed from the population, therefore the disease can easily go undetected.

*Other factors*

Other factors known to affect amphibian populations include drought, ultraviolet radiation, and environmental contaminants. Amphibians' semipermeable skin, development of eggs and larvae in water, and dual trophic position (herbivores, then carnivores) render them susceptible to both direct and indirect effects. Mining occurs in many areas containing Columbia spotted frogs as well as pesticide application to control insect and plant pests. High elevation historic mining habitat near Silver City was not found to support spotted frogs although it is well within the species range.

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## II. GUIDELINES - Protocols for Evaluating Project Effects (Great Basin population Columbia spotted frog)

Project effects should be evaluated if the proposed action is in upland habitat containing known occurrences of Great Basin population Columbia spotted frogs, OR if it is in unoccupied habitat that is otherwise suitable for maintaining population connectivity or restoring local populations (within the range delineated in Figure 1).

The following recommendations should be considered:

- Protect riparian and wetland habitats from degradation or alteration. Manage livestock grazing activities on stream habitat to avoid compaction, late season vegetative loss, willow damage, stream channelization and down cutting, and associated lowering of the water table in the floodplain.

- Development proposals for springs and associated outflows should maintain the viability of wetland habitats associated with that spring or protect the porous seepy habitat structure for frog hibernation.

- Do not allow diversion of water from natural stream channels.

- Protect existing stock ponds that currently harbor reproducing Great Basin population Columbia spotted frog populations and stream (ephemeral, intermittent, and permanent) corridors that connect suitable frog habitats.

- Great Basin population Columbia spotted frog habitat in the Owyhee Uplands occurs on private land - flat floodplains with seasonally flooded wetlands and perennial sources of water. Cooperative projects with private landowners to protect spotted frog habitats could be very beneficial.